SPECIFICATION

INSTALLATION PRACTICE FOR REHABILITATION OF A SECTION OF A SEWER PIPE USING CURED-IN-PLACE PIPE BY MEANS OF AIR INVERSION

#1661 V.1, 6/16 (16-6-533)

INSTALLATION PRACTICE FOR REHABILITATION OF A SECTION OF A SEWER PIPE USING CURED-IN-PLACE PIPE BY MEANS OF AIR INVERSION

1.0 INTENT

It is the intent of this specification to provide cured-in-place pipe (CIPP) for the reconstruction of a particular section of sewer pipe without excavation while maintaining quality and quantity of the thermoset resin, and protecting workers and the environment during the pipe rehabilitation process.

2.0 GENERAL

The reconstruction will be accomplished using a liner tube of a particular length and a thermo-set resin with physical and chemical properties appropriate for the application. The tube positioned within a translucent inversion bladder is vacuum impregnated with the resin, then placed inside a protective launching device and winched through the sewer pipe. When the launching device is properly positioned, the end is opened and the resin-saturated tube and bladder are inverted out of the launching device and through the damaged section using controlled air -pressure. Once the tube/resin composite is cured, the inversion bladder is re-inverted back into the launching device and removed from the pipe. The liner system shall be capable of repairing pipe defects for pipe diameters from 6 in. to 48 in. and in continuous lengths up to seventy-five (75) feet, depending upon diameter.

To achieve a verifiable water-tight liner, the resin-saturated liner shall be cured with molded gaskets embedded in-place between the host pipe and the new liner.

3.0 MATERIAL

The tube will consist of one or more layers of flexible coated or non-coated (please specify) non-woven needled felt or a reinforced non-woven. The tube will be continuous in length exhibiting a uniform minimum wall thickness based upon design calculations found in ASTM F1216 appendix XI. No overlapping sections shall be allowed in the circumference or the length of the liner. The tube shall include compressible material at each end forming a smooth transition to the host pipe. The liner will be capable of conforming to offset joints, bells, and disfigured pipe sections. The resin will be polyester, or vinyl-ester with proper catalysts as designed for the specific application. The cured-in-place pipe shall provide a smooth bore interior. Each installation shall have a design report documenting the design criteria for a fully deteriorated pipe section, or a partially deteriorated pipe in cases where the pipe has previously been lined.

The cured-in-place pipe shall meet or exceed the minimum test standards specified by the American Society for Testing Methods as described in the most current ASTM F1216 standard.

TABLE 1		
PROPERTY	**STANDARD**	**MINIMUM VALUE**
Flexural Strength	ASTM D790	4,500 psi (31 MPa)
Flexural Modulus	ASTM D790	250,000 psi (1,724 MPa)

4.0 INSTALLATION PROCEDURE

The installation procedure shall conform to ASTM F2599 "Standard Practice for Sectional Repair of Damaged Pipe by Means of an Inverted Cured-In-Place Liner".

4.1 When required, the flow shall be by-passed. The pumping system will be sufficiently sized for normal to peak flow conditions. The up stream manhole is monitored at all times and an emergency deflate system will be incorporated so that the plugs may be removed at any time without requiring confined space entry.

4.2 Installer will clean and inspect the line using a pan/tilt camera capable of verifying active or inactive service connections and the overall structural condition of the pipeline. All roots, debris, and protruding service connections will be removed prior to reconstruction of the pipe segment.

4.3 The tube is inspected for tears or frayed sections. The tube, in good condition, will be outfitted with expanding hydrophilic O-rings at each end to form a compression end seal. The tube is inserted into the translucent inversion bladder. The liner tube shall be frangibley attached to the inversion bladder at the leading end. A sufficient amount of approved catalyzed resin is introduced into the tube under a controlled vacuum. The slug is moved through a set of calibration rollers progressing towards the vacuum for controlled resin saturation. All resin shall be contained within the tube to ensure no public property or persons are exposed to the liquid resin. A resin-impregnated sample (wick) shall be retained by the installer.

4.4 The saturated tube along with the inversion bladder will be inserted into a flexible inversion launcher device. The inversion launching device is pulled into the pipe using a cable winch. The pull is complete when the end of the launching device is aligned with the beginning of the damaged pipe section. The resin and tube are completely protected during the pull. No resin shall be lost by contact with manhole walls or the pipe during the pull. The resin that provides a structural liner shall not contact the pipe until positioned at the point of repair. The resin should not be contaminated or diluted by exposure to dirt, debris, or water during the pull.

4.5 The installer shall be capable of viewing the beginning of the liner contacting the host pipe verifying the exact placement of the liner. Video documentation of the placement, prior to curing, shall be provided to the owner. No measuring from a CCTV counter or estimating will be allowed. The liner must be installed at low pressure (not to exceed 10-PSI) to prevent damage or further damage to the host pipe.

4.6 The tube will be inverted out of the inversion launching device by controlled air-pressure. The installer shall be capable of viewing the entire liner contacting the host pipe from the beginning to the end of the liner verifying the liner has covered the entire damaged section. Video documentation of the entire liner contacting the host pipe, prior to curing shall be provided to the owner. The tube is held tightly in place against the wall of the host pipe by the pressure until the cure is complete.

4.7 When the curing process is complete, the pressure will be released. The inflation bladder and launching device shall be removed from the host pipe with the winch. No barriers, coatings, or any material other than the cured tube/resin composite, specifically designed for desirable physical and chemical resistance properties, should ever be left in the host pipe. Any materials used in the installation other than the cured tube/resin composite must be removed from the pipe by installer.

4.8 Any service lateral connections covered by the sectional repair are to be opened using a self-propelled robotic cutting device specifically designed for cutting cured-in-place pipe.

4.9 A second CCTV inspection is performed to verify the proper cure of the material, the proper opening of service laterals, and the integrity of the seamless pipe. The owner will receive video recording documenting the inspection and a written report documenting the repair.

4.10 The by-pass pumping system is removed and the sewer flows restored to normal flow conditions.

5.0 DEVIATIONS

Should the pre-installation video inspection reveal pipe conditions substantially different than those used in the liner design and costs for the repair, the installer is required to request appropriate changes, supporting such requests by videotape recording of the existing conditions and if applicable, any new design calculations by a licensed P.E. in the state work is performed. Approved changes by the owner or its engineer will be reflected by an appropriate addition or deduction in the unit price.

6.0 CLEAN-UP

The site will always be left clean and the property restored to conditions equal to site conditions prior to the pipeline reconstruction project undisturbed.

7.0 FINAL ACCEPTANCE

Upon completion, the installer will deliver a digital video recording and report describing the repair to the owner or its engineer.

- End of Section -